

REMARKS

The Election of Species requirement has been withdrawn by the Examiner.

Support for the amendments to Claims 11 and 22 which now require that the diluent be present in an amount of at least 60% by weight can be found in the present specification in Table 1 on page 41, lines 7-10. Claim 18 has been cancelled by the preceding amendment. Claim 19 has been amended to alter the dependency since Claim 18 has been cancelled. Claim 19 is now dependent on Claim 11.

In addition, Claims 11 and 22 have been amended to remove the language "may or may not be" and "may be" and substitute acceptable language therefore. The phrase "is optionally" has been substituted for "may or may not be", and the term "are" has been substituted for the phrase "may be". Also, within the definition of Y, the language has been amended to clarify that it is the carbon atoms of the polymerized form of the alkylene oxide(s) containing from 2 to 8 carbon atoms that the term "the carbon atoms" refers to.

Claims 13 and 24 have been amended to clarify that the molecular weight of the macromers is number average molecular weight. Support for this amendment can be found in the original specification on page 18, lines 11-21 in which the macromers are described in terms of the molecular weights and the number of hydroxyl groups per molecule; and from the macromers prepared in Example 1a and in Example 1b which are described in terms of number average molecular weight (MW_n). See page 39, line 32 through page 40, line 1; and page 40, lines 19-20.

Claims 13 and 24 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. This rejection is moot in view of the preceding amendments to Claims 13 and 24.

Claims 11-31 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the invention which Applicants regard as their invention.

The first reason for this rejection is that the use of the language "may or may not be" in Claims 11 and 22 renders the claims indefinite. Applicants respectfully

submit that the preceding amendments to Claims 11 and 22 remove the basis for this portion of the rejection.

The second reason for this rejection is that it is unclear what the language "the carbon atoms" within the definition of Y within Claims 11 and 22 refers to. The preceding amendments to Claims 11 and 22 are believed to remove the basis for this portion of the rejection also.

The third reason is that within Claims 17 and 28 the language "amount 2%" appears to be improper. Applicants preceding amendment has corrected this typographical error.

Fourth is that within Claims 21 and 31, the language "less about 50%" appears to be improper. This typographical error was also corrected by the preceding amendment.

The fifth reason for this rejection is that within Claims 21 and 31 it is unclear what constituted "low unsaturation" as this language is subjective.

The sixth reason is that within the definition of "Y" in Claims 11 and 22, it is unclear what compounds are encompassed by the language "polymerized form". (In the sixth reason presented by the Examiner, he refers to Claims 11 and 21, but Applicants assume this is a typographical error and that Claims 11 and 22 were intended as the term "polymerized form" is not present in Claim 21. See 2nd full paragraph on page 3 of the Office Action dated February 7, 2006.)

Finally, the last reason for this rejection is that the structure of the macromer is confusing in view of the definitions of X and Y. The Examiner states that it is "unclear if the macromer is required to have a S-O- or O-O linkage".

Applicants respectfully disagree with the fifth, sixth and seventh reasons for the rejections of Claims 11-31 under 35 U.S.C. 112, second paragraph.

As set forth by the court in *In re Moore and Janoski*, 169 USPQ 236 (CCPA, 1971), the issue is "whether the claims do, in fact, set out and circumscribe a particular area with a reasonable degree of precision and particularity. It is here where the definiteness of the language employed must be analyzed - not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level

of skill in the pertinent art." Thus, Applicants respectfully submit that the claims must be read and interpreted in light of both the present specification and the prior art.

The present specification provides one of ordinary skill in the art clear guidance into what the level of unsaturation in these so-called "low-unsaturation polyols" is at page 22, line 32 through page 23, line 1. More specifically, these are clearly described as having "typically 0.02 meq/g or less of unsaturation". The specification also provides the test method by which the unsaturation is to be measured. It is respectfully submitted that the claims do not have to contain each and every limitation provided in the specification to satisfy the definiteness requirement of the second paragraph of 35 U.S.C. § 112. It is only necessary that one skilled in the art possess a reasonable degree of certainty, in light of the specification, as to exactly what subject matter is encompassed by the claim language. Applicants therefore submit that in view of the present specification, Claims 21 and 31 are definite as required by 35 U.S.C. § 112, second paragraph.

The language "polymerized form" is also definite and one of ordinary skill in the art would have no difficulty in understanding the meaning of this term in the manner used in Claims 11 and 22, or what compounds are encompassed by this language which is used in defining Y. Applicants respectfully submit that the present specification clearly provides one of ordinary skill in the art sufficient details into the ethylenically unsaturated macromers (1) which are polymerized with one or more ethylenically unsaturated monomer (2) in the presence of one or more free-radical polymerization initiator (3), and a liquid diluent (4) and, optionally, a chain transfer agent (5) to form pre-formed stabilizers, as required by Claims 11 and 22.

More specifically, a description of how these ethylenically unsaturated macromers (i.e. component (1)) of Claims 11 and 22 are prepared is set forth in the present specification on page 7, line 4 through page 8, line 4. As described therein, a monofunctional compound represented by the specified structure on page 7, lines 7-23 is reacted with one or more alkylene oxides in the presence of one or more non-cationic alkoxylation catalyst. These ethylenically unsaturated macromers and the process of preparing these are the subject of Claims 1-10. Claims 1-10 have been withdrawn from the present application due to a restriction requirement under 35 U.S.C. 121. It is, however, readily apparent to one of ordinary skill in the art from

the present specification that a "polymerized form" as used in the claim language to define Y in Claims 11 and 22 refers to the polymerized alkylene oxides which are reacted with the monofunctional compound corresponding to the structure on page 7, lines 7-23. Thus, one of ordinary skill in the art would possess a reasonable degree of certainty as to exactly what is meant by "polymerized form" with regard to Y in Claims 11 and 22 upon reading the present specification. Accordingly, the language of Claims 11 and 22 are definite as required by the second paragraph of 35 U.S.C. 112, second paragraph.

Finally, with regard to the issue raised by the Examiner that the structure is confusing in view of the definitions of X and Y, since the definition of Y appears to encompass oxygen or ether terminated structures, the Examiner stated it is unclear if the macromer is required to have a -S-O- or -O-O- linkage. Applicants respectfully disagree.

One of ordinary skill in the art would readily know that the macromer required by the presently claimed invention does not have either a S-O- or a O-O- linkage as questioned by the Examiner. In fact, the skilled artisan would have no problem in understanding exactly what Applicants are claiming or understanding the correct structure of the macromer. The polymerized form of an alkylene oxide such as, for example, ethylene oxide would be understood by one of ordinary skill in the art as referring to the structure: $[-CH_2-CH_2-O-CH_2-CH_2-]$. The polymerized form of propylene oxide would be understood as referring to the structure: $[-CH_2-CH(CH_3)-O-CH_2-CH(CH_3)-]$. These are commonly used and accepted interpretations by one of ordinary skill in the art for the meaning of a polymerized form of an alkylene oxide. For the Examiner's convenience, Applicants are submitting Exhibit A with this amendment to further illustrate the proper meaning and interpretation of the language defining the variables within the structure of these macromers. It is respectfully submitted that in light of this information, the presently required ethylenically unsaturated macromer does not contain either a -O-O- or a -S-O- linkage.

Upon reading the present specification and particularly the description of the preparation of these ethylenically unsaturated macromers on page 7, line 7 through page 8, line 4, the skilled artisan would readily know and understand that the

meaning of "a polymerized form of at least one alkylene oxide" in the definition of Y is properly interpreted as set forth above. This definition is a common and accepted definition of this term. Applicants therefore submit that the present claim language, including the definition of Y, is clear and definite as required by the second paragraph of 35 U.S.C. § 112. The skilled artisan would know with a reasonable degree of certainty exactly what subject matter is encompassed by the present claim language.

In view of the above amendments and remarks, Applicants respectfully request that the rejections under 35 U.S.C. § 112 be withdrawn.

Claims 11-19 and 22-29 were rejected under 35 U.S.C. § 102(b) as being anticipated by the Preston et al reference (U.S. Patent 4,202,947), the Preston et al reference (U.S. Patent 4,186,271), or the Yu reference (U.S. Patent 4,680,358).

The Preston et al reference (U.S. Patent 4,202,947) discloses graft copolymers prepared by reacting certain alkenyl aryl polyols with ethylenically unsaturated monomer. The alkenyl aryl polyol reactant corresponds to one of three formulas as specified at column 2, lines 10-29; column 2, lines 38-54; and column 3, lines 3-14. These alkenyl aryl polyols are reacted with one or more unsaturated monomers, optionally in the presence of an additional base polyol, to form the graft polymers therein. See column 4, lines 60-68.

The Preston et al reference (U.S. Patent 4,186,271) describes unsaturated polyols containing alkenyl aryl constituents. These unsaturated polyols are prepared by reacting a polyol with an aromatic derivative containing both an alkenyl constituent and a second functionality that is reactive with a polyol. The alkenyl aryl polyols described in the '271 patent may contain multiple hydroxyl groups, and corresponds to the formula as specified at column 2, lines 45-66. These alkenyl aryl polyols can be used to prepared graft copolymers. In fact, the alkenyl aryl polyols of the '271 patent are suitable for the preparation of graft copolymers of the '947 patent. Thus, although the '271 and the '947 patents are not related in the sense of belonging to the same patent family, the products described and claimed in the '271 patent are reactants for forming the graft copolymers in the '947 patent.

Styryl terminated macromolecular monomers of polyethers are disclosed in the Yu reference (U.S. Patent 4,680,358). This reference is discussed in the background of the present application at page 6, lines 1-9. These are prepared by polymerizing (A) a cationically ring-openable cyclic ether selected from alkylene oxides and glycidyl ethers, and (B) a monoolefinically (i.e. styrylically) unsaturated primary or second alcohol which corresponds to the structure set forth at column 4, lines 1-20, in the presence of (C) a cationic initiator. This yields macromers having the structure $R-(M)_m - OH$, in which R represents the residue of the styrylically unsaturated alcohol, M represents the residue of at least one cyclic ether which is ring-opened, and m represents an integer in the range of from 2 to 500.

Applicants respectfully submit that the presently claimed invention is clearly directed to pre-formed stabilizers. These pre-formed stabilizers comprise the reaction product of (1) an ethylenically unsaturated macromer of a specific formula, with (2) at least one ethylenically unsaturated monomer, in the presence of (3) at least one free-radical polymerization initiator, (4) at least about 60% by weight of a liquid diluent, and, optionally, (5) a chain transfer agent. The pre-formed stabilizers of the present claims may be used to prepare polymer polyols (see Claims 32-47, now withdrawn).

Both of the Preston et al references and the Yu reference describe macromers, but are silent with respect to preformed stabilizers prepared from these macromers. These references also generally describe the preparation of polymer polyols or graft polymer dispersions from these macromers.

Macromers and pre-formed stabilizers are not the same. One of ordinary skill in the art knows and understands the differences between these two types of compounds. As discussed in the background of the present application on page 1, lines 19- 21, a macromer is a molecule comprising one or more polymerizable double bond and one or more hydroxyl-terminated polyether tails. Macromers are generally characterized as containing induced reactive unsaturation. By comparison, a pre-formed stabilizer is the reaction product of a macromer with at least one monomer that is typically present in a diluent or solvent, and forms a co-polymer dispersion of low solids content (see page 2, lines 19-25 of the present application.) Pre-formed stabilizers are effective in producing polymer polyols having low viscosity

at a high solids content due to the small particle size which allows the particles to act as "seeds" in preparing polymer polyols. See page 2, line 26 through page 3, line 4.

The macromers described in the Preston et al reference (U.S. 4,186,271) are prepared by the reaction of a polyol with an aromatic derivative which contains both an alkenyl constituent and a second functionality reactive with a polyol. The second reactive functionality may be alkyl halide, carboxylic acid, acid halide, or ester (see column 3, lines 1-4). As described at column 5, line 47 through column 6, line 31, the macromers (i.e. alkenyl aryl polyols) are suitable for forming graft copolymers. The graft copolymers are prepared by reacting the alkenyl aryl polyols (i.e. macromers) with one or more ethylenically unsaturated monomers (e.g. styrene, acrylonitrile, etc., usually in the presence of a base polyol with a free-radical initiator. Examples III through V of the '271 patent and Examples III-V of the '947 patent are examples of graft copolymers prepared from these vinyl benzyl polyols, i.e. macromers.

These three examples appear to be identical in both of the Preston et al patents. The graft copolymer of Example III has a styrene content of about 23% and a viscosity of 6400 cps. Example IV yields a graft copolymer having a solids content of about 11% and a viscosity of about 1500 cps (at 25°C). The graft copolymer of Example V has a solids content of about 10% and a viscosity of about 4750 cps (at 25°C).

By comparison, the presently claimed pre-formed stabilizers result in polymer polyols (or graft copolymers) with low viscosities but at significantly higher solids content. Pre-formed stabilizer 2a of the present application is prepared from Macromer 1a, with styrene/acrylonitrile as the monomers in 60% by weight of a diluent. See Table 1 on page 41 of the present application. This pre-formed stabilizer, i.e. 2a, was then used to prepare Polymer Polyols 4 and 5 as described at page 41, line 14 through page 15, line 5. Also see Table 2 on page 42. Polymer Polyol 4 exhibited a viscosity of 4700 cSt at 50% solids, and Polymer Polyol 5 exhibited a viscosity of 5026 cSt at 50% solids. Accordingly, pre-formed stabilizers of the present invention provide polymer polyols having low viscosities at much higher solids content than is possible with the macromers of the Preston et al references.

It should be noted that these references describe viscosity in cps while cSt is used in the present application. These two units are not directly comparable, nor can

one convert cps to cSt or vice versa. However, both cps and cSt are acceptable and commonly used measures of viscosity for polymer polyols. As is known and understood by one of ordinary skill in the art, a polymer polyol having a low viscosity alone is not sufficient, particularly if the solids content is too low. Overall, polymer polyols having low viscosities, high solids content, good stability, good filterability, and most preferably a high styrene content within the total solids are desirable.

The Yu reference also describes macromers and polymer dispersions in polyols from these macromers. As previously stated, the present invention is directed to pre-formed stabilizers not macromers. Also, the Yu reference does not disclose whether the macromer formed therein are suitable for preparing polymer polyols (or graft copolymers). An example of this reference, see Example 2, illustrates the use of the macromer (PECH homomacromer) from Example 1 as a dispersant in the precipitation polymerization of acrylic acid in benzene.

Applicants respectfully submit that it is readily apparent that these references which describe macromers, and either the preparation of polymer polyols (i.e. graft copolymers) from these macromers (i.e. the Preston et al references) or polymer dispersants prepared from these macromers (the Yu reference) do not properly anticipate the presently claimed present invention which is clearly directed to pre-formed stabilizers. It is further submitted that these references also do not render the presently claimed pre-formed stabilizers and/or a process for preparing these pre-formed stabilizers, obvious under 35 U.S.C. § 103(a). Therefore, the rejection of Claims 11-19 and 22-29 in view of either of the Preston et al references (U.S. Patent 4,186,271 and U.S. Patent 4,202,947) or in view of the Yu reference (U.S. Patent 4,680,358) are clearly improper. Applicants request that these rejections be withdrawn.

Claims 11-19 and 22-29 were rejected under 35 U.S.C. § 102(b) as being anticipated by the Hoffman reference (WO 87/03886).

The Hoffman reference discloses a process for preparing a polymer polyol. This process comprises (a) forming a dispersant by homopolymerizing a vinyl-terminated adduct or copolymerizing the adduct with at least one ethylenically unsaturated monomer in the presence of an active hydrogen compound as a solvent

in conditions such that the dispersant has a Brookfield viscosity of less than 25,000 cps (at 25°C) as a 20-35 wt.% solution of the polymer of the vinyl-terminated adduct in an active hydrogen-containing compound, and (b) polymerizing an ethylenically unsaturated monomer or mixture thereof in the presence of the dispersant and a base polyol under conditions such that the polymerized monomer forms a plurality of particles which are stabilized against agglomeration by the dispersant.

Applicants respectfully submit that the dispersants formed in (a) of this process do not properly anticipate the pre-formed stabilizers of the presently claimed invention. These vinyl-terminated adducts are polymers having a molecular weight of at least 200, preferably 300 to 8000, and contain ethylenic unsaturation. These are more preferably polymers of PO and/or EO having a hydroxyl functionality of 0 to 3, and containing 1 vinyl group per molecule (page 5, line 37 through page 7, line 2). The vinyl-terminated adducts are homopolymerized or copolymerized with an ethylenically unsaturated monomer to form a dispersant (i.e. a macromer) which is suitable for the preparation of polymer polyols. See page 10, lines 1-31.

The adducts of the Hoffman et al reference are the reaction product of a monol or polyol and a difunctional material having both ethylenic unsaturation and a group which reacts with an active hydrogen-containing group to form a bond. Specific examples of such difunctional materials which contain both ethylenic unsaturation and a group reactive with an active hydrogen-containing group include compounds such as, for example, ethylenically unsaturated isocyanates, acid anhydrides, acid halides and esters. Specifically preferred unsaturated isocyanates include, for example, isocyanatoethylmethacrylate (IEM), and (1,1-dimethyl-1-isocyanatomethyl)-isopropenylbenzene (TMI) (see page 7, lines 4-19). All of the examples of this reference use a vinyl-terminated adduct, i.e. a macromer, prepared from isocyanatoethyl methacrylate (IEM).

It is evident from the working examples of the Hoffman reference which prepare dispersants from these vinyl-terminated adducts prepared from IEM, that only a small quantity of a polyol or other such material is present. Example 1 uses about 8% of Polyol A; Example 2 uses about 18% of a high MW triol; Examples 3-5 also use about 18% of a high MW triol; Example 10 uses about 8% of Polyol B; and Example 11 uses about 18% of Polyol C. By comparison, a much higher quantity (at

least about 60%) of polyol or other diluent in the preparation of the presently claimed pre-formed stabilizers. Accordingly, Applicants respectfully submit that the macromers or dispersants prepared from the vinyl-terminated adducts in the Hoffman et al reference do not properly anticipate the presently claimed pre-formed stabilizers.

The rejection of Claims 11-19 and 22-29 as being anticipated by the Hoffman reference under 35 U.S.C. § 102(b) is clearly improper and it is requested that this rejection be withdrawn.

Claims 11-19 and 21-29 were rejected under 35 U.S.C. § 102(b) as being anticipated by the Holeschovsky et al reference (U.S. Patent 6,013,731). This reference is discussed in the background of the present application at page 3, lines 18-21 and at page 4, lines 12-21. Of the references cited by the Examiner, this is the only reference that discloses and/or describes pre-formed stabilizers as defined in the present application. These are, however, different than those of the presently claimed invention in view of the different stabilizer precursors used therein.

The Holeschovsky et al reference discloses stabilizer precursors and pre-formed stabilizers which have induced unsaturation and are prepared from these precursors. As described therein, these stabilizer precursors are commonly referred to as macromers or macromonomers (see column 4, lines 52-55), and may be used directly in the production of polymer polyols (column 7, lines 8-17). These stabilizer precursors may also be used in the preparation of a pre-formed stabilizer. The pre-formed stabilizers of this reference are prepared by polymerizing vinyl monomers in situ in the stabilizer precursor, optionally in the presence of a polyol or low molecular weight diluent, thus forming a fine dispersion of vinyl polymer particles at relatively low solids content (column 7, lines 18-24).

Stabilizer precursors of the Holeschovsky et al reference are prepared from polyoxyalkylene polyols modified to contain induced ethylenic unsaturation, with the polyols initially having low levels of intrinsic unsaturation and a nominal functionality of 1 or more. The precursors are prepared by reacting a polyoxyalkylene polyol which contains low intrinsic unsaturation with a suitable compound to introduce the induced unsaturation into the product. More specifically, this induced unsaturation

can be introduced by esterification with an unsaturated carboxylic acid or derivative thereof such as maleic anhydride or fumaryl chloride, also by amidation or imidation for amino-functional polyols, or by reaction with a compound that contains both isocyanate functionality and a reactive unsaturated group. Some such compounds which contain both isocyanate functionality and a reactive unsaturated group include, for example, isocyanatoethylmethacrylate (IEM), and α,α -dimethyl metaisopropenyl benzylisocyanate (TMI), or from adducts of isocyanate-reactive unsaturated compounds such as 2-hydroxyethylacrylate with a di- or poly-isocyanate. See column 6, lines 27-63.

It is respectfully submitted that these stabilizer precursors clearly do not anticipate the macromers required by the presently claimed invention. Accordingly, the pre-formed stabilizers of the Holeschovsky et al reference do not properly anticipate the pre-formed stabilizers of the present claims. It is therefore submitted that this rejection is improper and Applicants request that it be withdrawn.

Furthermore, it is respectfully submitted that the presently claimed pre-formed stabilizers produce polymer polyols which are as good as (if not better) than the polymer polyols produced from a stabilizer based on TMI, a preferred stabilizer of the Holeschovsky et al reference. The resultant polymer polyols can also be used to produce foams which exhibit similar properties as foams produced from a polymer polyol prepared from a stabilizer based on TMI.

Applicants direct the Examiner's attention to Polymer Polyols 3, 4 and 5 in Table 2 on page 42 of the present application. Polymer Polyol 3 was prepared from a pre-formed stabilizer based on TMI as in the Holeschovsky et al reference. Polymer Polyols 4 and 5 were prepared from PFS 2a, as described in Table 1 on page 41 of application, and is representative of the presently claimed pre-formed stabilizers. It is evident from Table 2 that Polymer Polyols 4 and 5 had slightly lower viscosities at the same solids content in the same formulation as compared to Polymer Polyol 3 (based on TMI). It is also apparent that the filterability of Polymer Polyols 4 and 5 is improved compared to that of Polymer Polyol 3. Therefore, it is respectfully submitted that the presently claimed pre-formed stabilizers are not properly rejected under 35 U.S.C. § 102(b) and/or 35 U.S.C. § 103(a) in view of the Holeschovsky et al reference.

Claims 20, 21, 30 and 31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Hoffman reference (WO 87/03886) in view of the Holeschovsky et al reference (U.S. Patent 6,013,731).

Applicants additionally submit that combining the Hoffman reference (WO 87/03886) and the Holeschovsky et al reference (U.S. 6,013,731) does not render any of Claims 11-31 (including Claims 20, 21, 30 and 31) unpatentable under 35 U.S.C. § 103(a).

Claims 20, 21, 30 and 31 of the present application are specifically directed to the diluent used to prepare the claimed pre-formed stabilizers. More specifically, the diluent is specifically either a monohydroxyl alcohol as in Claims 20 and 30, or a poly(xoypropyleneoxyethylene)polyol having an oxyethylene content of less than about 50% by weight and containing low unsaturation as in Claims 21 and 31.

As discussed above, the Hoffman reference does not disclose or suggest preparing pre-formed stabilizers as required by the presently claimed invention. The dispersants prepared from the vinyl-terminated adducts of this reference do not correspond to the pre-formed stabilizers of the present invention. Although the Holeschovsky et al reference does disclosed pre-formed stabilizers, these are prepared from different starting materials than those required by the present invention.

Furthermore, even if one could form the presently required macromer from the Hoffman reference, using this to form pre-formed stabilizers as in the Holeschovsky et al reference would not render the presently claimed invention obvious to one of ordinary skill in the art. As Applicants' pointed out above with regard to the Holeschovsky et al reference, the presently claimed pre-formed stabilizers form polymer polyols with similar viscosities at the same solids content in an otherwise identical formulation, but improved filterability. This is not obvious to one of ordinary skill in the art upon reading the Hoffman reference combined with the Holeschovsky et al reference. Accordingly, this combination of references does not properly render the presently claimed invention obvious under 35 U.S.C. § 103(a). It is therefore submitted that this rejection is also improper and Applicants request that it be withdrawn.

In view of the preceding amendments and remarks, Applicants respectfully submit that each of these rejections is improper and request that they be withdrawn. The allowance of Claims 11-31 is respectfully requested.

Respectfully Submitted,

By: N. Denise Brown
N. Denise Brown
Agent for Applicants
Reg. No. 36,097

Bayer MaterialScience LLC
100 Bayer Road
Pittsburgh, PA 15205-9741
(412) 777-3804
FACSIMILE PHONE NUMBER
(412) 777-3902

f:\shared\kpl\db327.ame

EXHIBIT A

